



## Blood Oxygen Meter/Sensor Analysis CSD fall 2011

**Project owner**  
BjornPehrson

**Project Coaches**  
Bruce Zamaere  
Erik Eliasson  
HervéNtareme  
SirajRathore

### Team members

Bowei Dai	daib@kth.se	15 credits
Elis Kullberg	elisk@kth.se	18 credits
Gurpreet Singh Sambhy	sambhy@kth.se	24 credits
HannesJunnila	haju@kth.se	15 credits
Nur Mohammad Rashed	nmrashed@kth.se	15 credits
SiddharthMadan	smadan@kth.se	15 credits
VasilyProkopov	Prokopov@kth.se	18 credits

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## **Purpose of document**

The purpose of this document is to research, compare, analyze and document different types of blood oxygen meters available in the market; with respect to Carenet.

## **Scope of document**

The scope of this document is to provide an overview and comparison about the different types of blood oxygen meters analyzed by us.

## **Audience of document**

The audience of this document will be the project coaches, stakeholders and future operators of the Carenet network.

## SENSOR COMPARISON

Name of the Product	Wireless Pulse Oximeter CMS-50E	Pulse Oximeter	Digital Pulse Oximeter CMS – 50F	Wrist Oximeter
Model Name	CMS-50E	LD4003	CMS-50F	SPO7500
Bluetooth or Wireless	Optional	No	No	No
Flash Memory	30 Hours of data storage	24h	24hrs of Data Storage	80 Hours
Advanced Software	Monitoring+	No	No	No
Features	Integrated with SPO2	SPO2 meters	No	No
Display	True ColorOLED With 4 Direction	OLEDColor of 128*64 Pixels	256k color OLED display with 4 directions	2 characters
Sound	Pulse Function and Alarm	Alarm levels	No	No
Battery	Rechargeable	Rechargeable	Lithium Ion Battery Cell	Lithium Battery
Chargeable	USB slot	Yes	Yes	No
Portable	Yes	Yes	Yes	Yes
Power Consumption + Supply	20mA	1.5V AA	3.7V	3.6V,1/2 AA
Optional	Wireless Functionality Tx & Rx	No	Wireless Functionality Tx& Rx	No
Carry case & User Manual	Yes	Yes	Yes	Yes
USB Connector Code	Yes	Yes	Yes	No
Power Adapter	Yes	Yes	Yes	No
Report	Full Study Oximetry Strip Chart Summary	NO	No	SPO report ,Preliminary Report (Histogram, Hypnogram)
Certified	ISO and FDA standards	ISO and FDA standards	No	No
Accuracy	+/-2% in stage of 70%-99%	+ -2% at level 70 - 100%	+ -2% at level 70 - 90%	+/- 2 in stage of 40 to 99%
Used In	hospital, home, community medical treatment, sports	hospital, home, community medical treatment, sports	hospital, home, community medical treatment,	hospital, home, community medical treatment, sports

	health care, etc.	health care, etc.	sports health care, etc.	health care, etc.
<b>Regular price</b>	\$399.99	2623 SEK	USD 127	USD 495
<b>Discount price</b>	\$89.95			

### Detail Description:

## Wireless pulse Oximeter CMS-50E

Wireless pulse Oximeter CMS-50E, CMS50E, wireless Oxygen Meter, Oxygen Meters, Oxygen Meter Level



- FDA 510K Approved
- Free Advanced Analysis Software
- Bluetooth or the wireless parts are optional

This Wireless Oxygen Oximeter can record the data and transfer it to your computer, then you can analyze it.

### Technical Parameters

- USB and Wireless interface to Computer
- Synchronous display on the Oximeter and computer
- Inner flash memory for more than 30 hours data storage
- Free Advanced software for sleep study and monitoring



### Features

- Integrated with SPO2 probe and processing display module
- Can be used in: hospital, home, community medical treatment, sports healthcare, etc.
- Can measure SPO2 and PR accurately
- SPO2 and PR display, PR waveform and bar graph display
- Battery voltage indicator
- Friendly Operation Menu for The Function Setting

- 4 Direction Display
- Four levels adjustable brightness
- Pulse sound function
- Alarm function; can set upper and lower limits.
- USB interface to Computer, software can analyse, store and print the data.
- Rechargeable Li battery
- Low power consumption; shut off automatically when no signal
- Small volume (57(L) \* 32(W) \* 30(H) mm) lightweight-convenient to carry

## Technical Parameters

- Display Format: True Colour OLED With 4 Direction Display
- 1.3' 65K Colour OLED display, resolution
- Pulse Wave: Colour OLED Graphic Display
- Battery Voltage Indication: Colour OLED Graph.
- Compact Size:
- Friendly Operation Menu for The Function Setting.
- Alarm: Visual and Audio
- Alarm Setting: 35-99%
- Pulse sound: Yes
- Power Supply: 3.7V Rechargeable Lithium Polymer Battery
- Charger: USB Charger like Apple ipod and AC charger
- Power Consumption: less than 20 mA( Wireless and alarm not work).
- SPO2: 35-99%
- Pulse Ratio: 3-255BPM
- Resolution: 1% for SPO2 and 1 BPM for Pulse Ratio.
- Measurement Accuracy: +/-2% in stage of 70%-99 for SPO2
- Unspecified in stage of 35-69% for SPO2
- +/-2%BPM or +/-2%(Select Larger) for Pulse Ratio
- It is equipped with a function switch, through which the Oximeter can be automatically powered off when no finger is in the Oximeter more than 4 seconds( Not available in Sleep study and Monitoring)

## Optional

- wireless links transmitter
- wireless links receiver

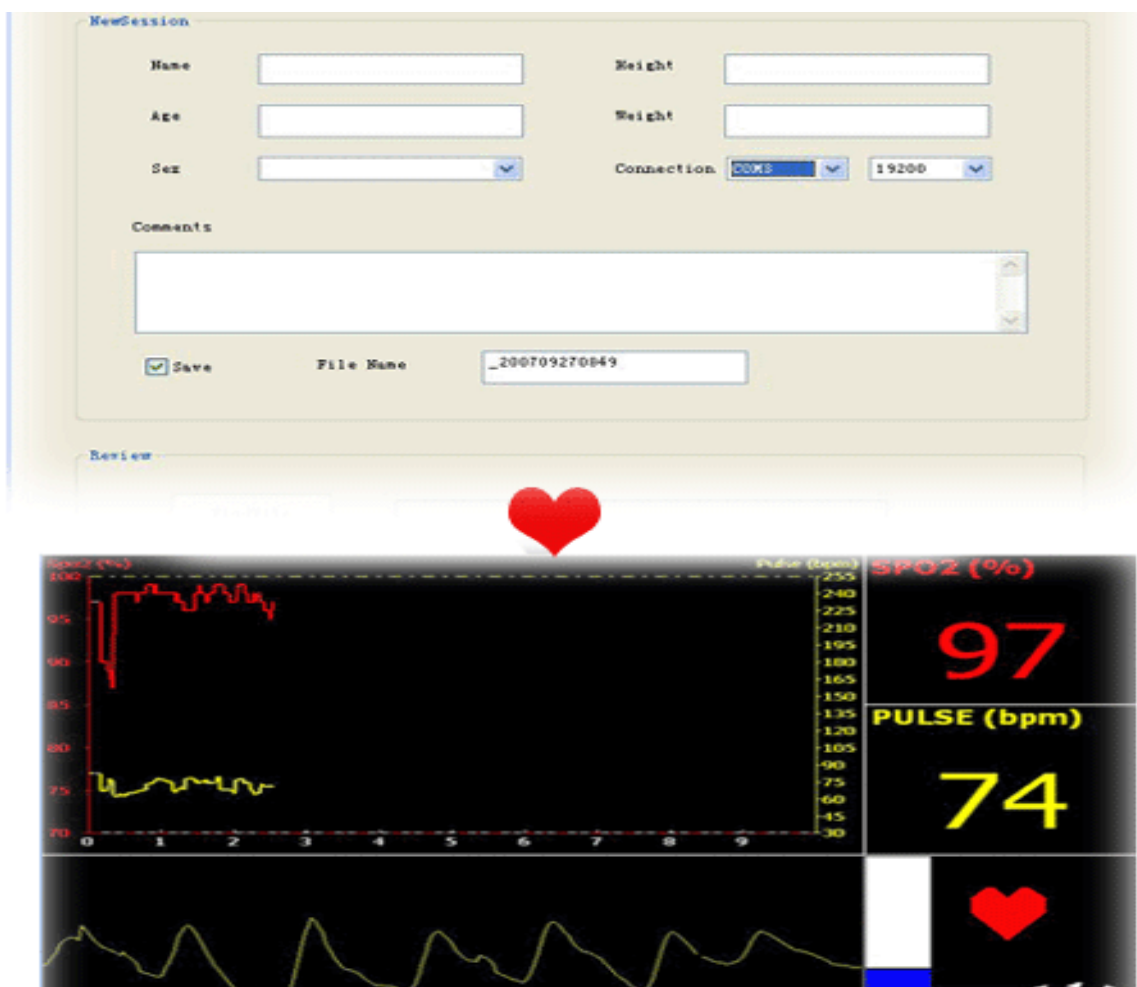


## Package Contents

- 1x CMS 50E Fingertip Pulse Oximeter
- 1x Neck/wrist cord
- 1x DC power adaptor plug
- 1x USB Connector cord
- 1x PC Software Disk
- 1x 3.7V Rechargeable lithium battery (Super long battery life)
- 1x User manual
- 1x Carry case
- If you order this Oximeter with wireless functionality, then you will get the transmitter and receiver



## Software Screenshot





# SpO2 Report ---OxiMetry Report

User Information	Name : lcheo	Height /cm : 170	Weight /kg : 55
Age : 25	Sex : Male	Duration : 01:52:17	Analysed : 01:52:17
Recording Date(mm/dd/yy) : 05/08/08 time : 15:05:18			

Comments						
Event Data	SpO2	Pulse	%SpO2 Level	Events	Below(%)	Time(%)
Total Events	4	95	99 - 95	3	100	100.0
Time In Events(min)	1.8	19.3	94 - 90	0	95	0.9
Avg. Event Dur.(sec)	26.8	12.2	89 - 85	1	90	0.2
Index (1/hr)	2.1	50.8	84 - 80	0	85	0.0
% Artifact	0.2	0.2	79 - 75	0	80	0.0
Adjusted Index (1/hr)	2.1	50.9	74 - 70	0	75	0.0
%SpO2 Data			69 - 65	0	70	0.0
Basal SpO2(%)	98.7		64 - 60	0	65	0.0
Time(min) < 88%	0.0		59 - 55	0	60	0.0
Events < 88%	0		54 - 50	0	55	0.0
Minimum SpO2(%)	88		49 - 45	0	50	0.0
Avg. Low SpO2(%)	93.8		44 - 40	0	45	0.0
Avg. Low SpO2 < 88%	-----		39 - 35	0	40	0.0
Pulse Data			34 - 30	0	35	0.0
Avg Pulse Rate(bpm)	97.2					
Low Pulse Rate(bpm)	54					

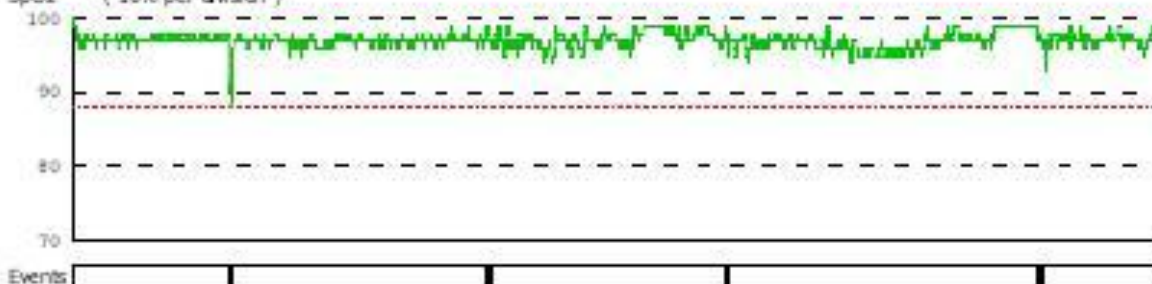
## Analysis Parameters

Desaturation Event: drop in SpO2 by at least 4% for a minimum duration of 30 seconds.

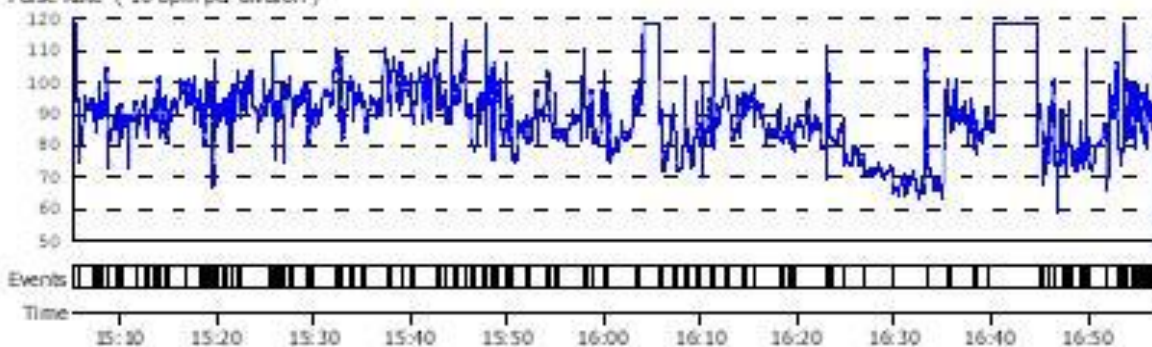
Pulse Event: Change in rate by at least 6 bpm for a minimum duration of 8 seconds.

## Graphic Summary

SpO2 ( 10% per division )



Pulse Rate ( 10 bpm per division )



SpO2 at  
4.00

SpO2 Events at  
4.00

[SPO2 Report --Full Study Report](#) and [SPO2 Report --Oximetry Report](#)  
[SPO2 Report --Strip Chart Report](#) and [SPO2 Report --Summary Report](#)

## Digital Pulse Oximeter CMS-50F



- The one to be worn comfortably on the patient's wrist for easy spot-check of blood oxygen saturation and pulse rate.
- Can be used for monitoring daily activities and overnight sleep studies, The compact design is intended to give the patient greater freedom while improving patient compliance.
- Compact and light weight design, fit comfortably on the patients wrist
- Simply plug in the sensor and out
- For spot checking short and long term monitoring applications
- High accuracy and repetition
- Friendly operation menu for the function setting
- 256k color OLED display with 4 directions
- Pulse strength: OLED Graphic display
- Battery Voltage indication: OLED graphic display
- Plethysmograph Wave to assist in obtaining a strong reading
- Can be used in high altitudes, at high & low temperatures
- Built-in Alarms for SPO2 and Pulse Rate
- Built-in Memory for up to 24hrs of Data Storage
- Ideal for Doctors, Home Health Care, Clinics, Hospitals
- Also can be used for Aviation, Sports, Mountain Climbers, Walkers
- Superior Color OLED Screen with Multi-Directional Views
- Brightness Adjustment for Viewing in any Light
- Built-in Rechargeable Lithium Ion Battery Cell
- Includes USB Cable for Download
- Includes SPO2 Monitoring Trend Software
- Inner flash memory for data storage
- Power supply: 3.7V Rechargeable Lithium battery and A.C charger with USB interface

## **SPO 7500 Wrist Oximeter Recording Package**

The SPO Medical 7500 Wristwatch Recording System offers the features of a conventional Oximeter in a compact, user-friendly wrist-based configuration. The SPO 7500 accurately measures blood oxygen saturation levels and heart pulse rate. Readings are displayed and stored (up to 80 hours) within a wristwatch unit that sits comfortably on the patient's wrist for maximum convenience and flexibility.

Cleared for sale in the USA by the FDA, the SPO 7500 pulse Oximeter is the world's first monitor for extending monitoring of blood-oxygen saturation and heart rate to use reflectance pulse Oximeter (RPO).

### **Features and Benefits**

- Model 7500 Pulse Oximeter with Memory (up to 80 hours)
- SPO reporting software with ability to transfer/export reports from one physician to another practitioner.

### **Materials Included**

- Carrying Case
- USB Data Transfer Cable
- Easy-to-use "slip-on" silicone thimble sensor
- Warranty Documentation
- Warranty Information
- 1-year warranty





## SPO 7500 Technical Specifications

### EFFECTIVE MEASURING RANGE

Saturation: 40 to 99%

Heart Pulse Rate: 40 to 250 bpm

Resolution: 1 Digit

### ACCURACY (INCL. MOTION ARTIFACTS AND LOW PROFUSION)

Saturation:  $\pm 2\%$  or  $\pm 2$  digits

Heart pulse rate:  $\pm 3\%$  or  $\pm 3$  digits

### POWER REQUIREMENTS:

3.6V Lithium Battery, 1/2 AA Size

### BATTERY CONTINUOUS LIFE:

300 Hrs.

### DISPLAY:

Saturation: 2 Characters

Heart Pulse Rate: 3 Characters

Signal Indicators: "Sensor OFF" and "Weak Signal" Flashing Heart Icon

Battery Indication: Full Power, 1/3 and Near Empty

### MECHANICAL:

Dimensions (Display): 2.68" x 1.65" x 0.87" (64 x 42x22mm)

Total Weight: 2 oz. (55g) Including Battery

### ENVIRONMENTAL:

Operating Temperature: 4°to42°C (39°to107°F)

Storage Temperature: -20°to70°C (-4°to158°F)

Humidity: Up to 95% Non-condensing

## CONCLUSION

We observed and studied a number of sensors and meters for blood oxygen content from various sources. We focused on the sensors which have connectivity as well as portability, which are very important for our project. We believe that the best option is the 'CMS-50E Wireless Oxygen meter'. This has more connectivity options as it is the only one which has an option of connecting wirelessly. This also has software that generates data and reports for the users. All the sensors mentioned in this report have high accuracy levels and are portable along with the standards of sensing. The 'CMS-50E Wireless Oxygen meter' seems to be the best choice due to its wireless connectivity option and its value for money.

A major concern with all the above mentioned meters is the data and file format used by the meter for the system generated data and reports. This can be a problem if the data format is not compatible with the Carenet system. We will look into the data formats of the preferred and recommended meters and contact the manufacturers for more information. If the data and the reports are not possible to use in the Carenet system then we recommend that the existing 'Phillips Intellivue x2' meter for the sensor connectivity.

*Note: The document will be updated after we finish the research on the data and file formats used.*

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